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Resolving the species of the lichen genus *Graphina* Müll. Arg. in China, with some new combinations

Ze-Feng Jia[1], Robert Lücking[2]

1 *College of Life Sciences, Liaocheng University, Liaocheng 252059, Shandong Province, China* **2** *Botanischer Garten und Botanisches Museum, Freie Universität Berlin, Königin-Luise-Strasse 6–8, 14195 Berlin, Germany*

Corresponding author: *Ze-Feng Jia* (zfjia2008@163.com)

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Abstract

In the framework of continuing studies on the *Graphidaceae* in China, the status of all taxa traditionally assigned to the genus *Graphina* reported from China are resolved in the present paper. Five new combinations are made, namely *Diorygma isabellinum* (Zahlbr.) Z.F. Jia & Lücking, **comb. nov.**, *Fissurina adscribens* (Nyl.) Z.F. Jia & Lücking, **comb. nov.**, *Graphis lecanactiformis* (Zahlbr.) Z.F. Jia & Lücking, **comb. nov.**, *Phaeographis haloniata* (Zahlbr.) Z.F. Jia & Lücking, **comb. nov.** and *Platygramme taiwanensis* (J.C. Wei) Z.F. Jia & Lucking, **comb. nov.** Five new synonymies were found: *Graphina olivascens* Zahlbr. (= *Fissurina adscribens*), *Graphina plumbicolor* Zahlbr. (= *Phaeographis haloniata*), *Graphina roridula* Zahlbr. and its variety *platypoda* Zahlbr. [= *Diorygma pachygraphum* (Nyl.) Kalb, Staiger & Elix], and *Graphina taiwanensis* f. *obscurata* J.C. Wei (= *Platygramme taiwanensis*).

Key words

Lichens, taxonomy, Graphidaceae, Ostropales, Lecanoromycetes, Ascomycota

Introduction

The lichen genus *Graphina* Müll. Arg. entailed an artificial concept of ascospore-based genera in *Graphidaceae* Dumort., including all graphidoid species with muriform, hyaline ascospores (Müller 1880). Based on phenotypic and molecular studies, a new classification of genera within the family was recently established (Staiger 2002; Rivas Plata et al. 2012). As a result, the genus *Graphina* was placed in synonymy with *Thalloloma* Trevis., based on the systematic affinities of its presumed type species, *Graphina*

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anguina Müll. Arg. [= *Thalloloma anguinum* (Mont.) Trevis.] (Staiger 2002). However, *G. anguina* had not actually been included in the protologue of *Graphina*, and therefore a new lectotype had to be selected, namely *G. puiggarii* Müll. Arg., which makes *Graphina* a synonym of *Graphis* Ach. (Lücking et al. 2007). Following the current generic concept of *Graphidaceae* (*sensu* Staiger 2002), many species of *Graphina* belong in *Graphis* s. str., whereas others have been moved into other genera based on phylogeny, apothecial morphology and/or anatomy.

During our study of Chinese *Graphidaceae*, we attempted to resolve the status of all species reported with the genus name *Graphina* from China (Wei 1991; Aptroot and Seaward 1999; Aptroot and Sipman 2001, Aptroot and Sparrius 2003). We found that 33 species were reported, which are here presented in the form of an updated 'checklist' and transferred to the corresponding genera, namely *Carbacanthographis* Staiger & Kalb, *Diorygma* Eschw., *Fissurina* Fée, *Graphis* Adans., *Phaeographis* Müll. Arg., *Platygramme* Fée, *Platythecium* Staiger and *Thalloloma* Trevis.

Materials and methods

Type material cited here was either obtained on loan from the herbaria in H, PC, and W or studied in the cited herbaria. Because many of the names discussed here have already been treated by Kalb et al. (2004), Staiger (2002), Nakanishi et al. (2003) and Lücking et al. (2009), we do not provide full synonymies and type specimen citations unless the name has not previously been treated or the type specimen is particularly relevant to the discussion. A dissecting microscope (Olympus SZX12) and a light microscope (Olympus BX51 and Nikon Eclipse-55i) were used for the morphological and anatomical studies. Measurements and illustrations were taken from the manual cross sections of fruit bodies in water. The amyloidy of the ascospores was tested using Lugol's solution. The lichen substances were detected and identified by thin-layer chromatography (Culberson and Kristinsson 1970; Culberson 1972; White and James 1985). Newly proposed taxonomic names and combinations were deposited in MycoBank.

Taxonomy

List of the Chinese species previously reported under the name *Graphina* Müll.Arg.

Below, a list of all species reported under *Graphina* from China is provided. Following modern concepts of the *Graphidaceae* (Staiger 2002; Rivas Plata et al. 2012), the current name is indicated, accompanied by brief notes.

1. *Graphina acharii* (Fée) Müll. Arg.
Mém. Soc. Phys. Hist. Nat. Genève 29(8): 38, 1887.
≡ ***Graphis acharii*** Fée, Essai Crypt. Exot. (Paris): 39, 1825.

Following Lücking et al. (2009), this taxon belongs in *Graphis* as *G. acharii* Fée. It is a corticolous species reported from Hong Kong (Aptroot and Sipman 2001) and Taiwan (Aptroot and Sparrius 2003).

2. *Graphina adscribens* (Nyl.) Müll. Arg.

Hedwigia 31: 284, 1892.

≡ ***Fissurina adscribens*** (Nyl.) Z.F. Jia & Lücking, **comb. nov.** (see below).

This taxon belongs morphologically in *Fissurina* and the combination in that genus as *F. adscribens* (Nyl.) Z.F. Jia & Lücking is required (see below). It is a corticolous species reported from Hong Kong (Thrower 1988).

3. *Graphina alpestris* Zahlbr.

in Handel-Mazzetti, Symb. Sin. 3: 56, 1930.

≡ ***Graphis alpestris*** (Zahlbr.) Staiger, Biblthca Lichenol. 85: 205, 2002.

Following Staiger (2002), this taxon belongs in *Graphis* as *G. alpestris* (Zahlbr.) Staiger. It is a corticolous species reported from Yunnan (Zahlbruckner 1930, 1932; Wang et al. 2008; Jia and Wei 2016) and Hainan (Jia and Wei 2011, 2016).

4. *Graphina analoga* (Nyl.) Zahlbr.

Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 83: 107, 1909.

≡ ***Graphis analoga*** Nyl., Ann. Sci. Nat., Bot., sér. 4, 11: 244, 1859.

Following Lücking et al. (2009), this taxon belongs in *Graphis* as *G. analoga* Nyl. It is a corticolous or sometimes saxicolous species reported from Hong Kong (Aptroot and Seaward 1999; Aptroot and Sipman 2001) and Taiwan (Aptroot and Sparrius 2003).

5. *Graphina cleistoblephara* (Nyl.) Zahlbr.

Cat. Lich. Univers. 2: 401, 1923.

≡ ***Graphis cleistoblephara*** Nyl., Ann. Sci. Nat., Bot., sér. 4, 20: 265, 1863.

Following Staiger (2002), this taxon belongs in *Graphis* as *G. cleistoblephara* Nyl. It is a corticolous species reported from Hainan (Jia and Wei 2011; Wei et al. 2013; Jia and Wei 2016), Yunnan (Jia and Wei 2011, 2016); Taiwan (type location, Zahlbruckner 1940; Lamb 1963; Wang and Lai 1973, 1976), Hong Kong (Thrower 1988), and mainland China (prov. not indicated: Hue 1891).

6. *Graphina colliculosa* (Mont.) Hale

Lich. Amer. Exs.: 156, 1976.

≡ ***Platythecium colliculosum*** (Mont.) Staiger, Biblthca Lichenol. 85: 380, 2002; *Sclerophyton colliculosum* Mont., Ann. Sci. Nat., Bot., sér. 3, 16: 61, 1851.

Following Staiger (2002), this taxon belongs in *Platythecium* as *P. colliculosum* (Mont.) Staiger. It is a corticolous species reported from Hong Kong (Thrower 1988; Aptroot and Sipman 2001) and Taiwan (Aptroot and Sparrius 2003). Material under this name reported by Thrower (1988: 94) from Hong Kong contains norstictic acid and has muriform ascospores, about 15 × 5 μm in size, with four transverse

and one or two longitudinal septa and belongs to *P. dimorphodes* (Nyl.) Staiger; the other material illustrated by the same author on page 95, with ascospores 25–35 µm long, could not be identified with certainty but may represent a species of another genus, e.g. *Diorygma*.

7. *Graphina erythrella* (Mont. & Bosch) Zahlbr.

Cat. Lich. Univers. 2: 405, 1923.

≡ ***Diorygma erythrellum*** (Mont. & Bosch) Kalb, Staiger & Elix, Symb. Bot. Upsal. 34(1): 150, 2004; *Ustalia erythrella* Mont. & Bosch, in Junghuhn, Pl. Jungh. 4: 478, 1855.

Following Kalb et al. (2004), this taxon belongs in *Diorygma* as *D. erythrellum* (Mont. & Bosch) Kalb, Staiger & Elix. It is a corticolous species reported from Taiwan (Aptroot and Sparrius 2003).

8. *Graphina filiformis* Zahlbr.

Feddes Repert. 31: 214, 1933.

= ***Graphis japonica*** (Müll. Arg.) A.W. Archer & Lücking, in Lücking, Archer & Aptroot, Lichenologist 41(4): 437 (2009).

Following Lücking et al. (2009), this name is a synonym of *Graphis japonica* (Müll. Arg.) A.W. Archer & Lücking. It is a corticolous species reported from Zhejiang (Jia and Wei 2016), Fujian (Jia and Wei 2011, 2016), Hainan (Jia and Wei 2011, 2016; Wei et al. 2013), Hong Kong (Jia and Wei 2016) and Taiwan (type location as *Graphina filiformis* Zahlbr., Zahlbruckner 1933, 1940; Wang and Lai 1973).

9. *Graphina fissofurcata* (Leight.) Müll. Arg.

Flora 65(24): 385, 1882.

= ***Graphis streblocarpa*** (Bél.) Nyl., Flora 49: 133, 1874.

Following Lücking et al. (2009), this name is a synonym of *Graphis streblocarpa* (Bél.) Nyl. It is a corticolous or rarely saxicolous species reported from Zhejiang (Wu and Qian 1989), Fujian (Jia and Wei 2011, 2016) and Hong Kong (Aptroot and Seaward 1999; Aptroot and Sipman 2001).

10. *Graphina galactoderma* Zahlbr.

in Handel-Mazzetti, Symb. Sin. 3: 57, 1930.

≡ ***Graphis galactoderma*** (Zahlbr.) Lücking, in Lücking, Archer & Aptroot, Lichenologist 41(4): 436 (2009)

Following Lücking et al. (2009), this taxon belongs in *Graphis* as *G. galactoderma* (Zahlbr.) Lücking. It is a corticolous species reported from Yunnan (type location, Zahlbruckner 1930, 1932) and Guizhou (Jia and Wei 2016).

11. *Graphina haloniata* Zahlbr.

Feddes Repert. 31: 216, 1933.

≡ ***Phaeographis haloniata*** (Zahlbr.) Z.F. Jia & Lücking, **comb. nov.** (see below).

The presence of brownish ascospores, an exposed, broad disc, and a slightly carbonized exciple shows that this taxon has to be transferred to *Phaeographis* (see below). It is a corticolous species reported from Taiwan (type location, Zahlbruckner 1933, 1940; Lamb 1963; Wang and Lai 1973; Aptroot and Sparrius 2003).

12. *Graphina hiascens* (Fée) Müll. Arg.

Mém. Soc. Phys. Hist. nat. Genève 29(8): 42, 1887.

= ***Graphis hiascens*** (Fée) Nyl., Ann. Sci. Nat., Bot., sér. 4, 11: 226, 1859; *Opegrapha hiascens* Fée, Essai Crypt. Exot., Suppl. Révis. (Paris): 25, 1837.

Following Lücking et al. (2009), this taxon belongs in *Graphis* as *G. hiascens* (Fée) Nyl. It is a corticolous species reported from Hainan (Jia and Wei 2011, 2016), Hong Kong (Thrower 1988; Jia and Wei 2016) and Taiwan (Aptroot and Sparrius 2003).

13. *Graphina hologlauca* Zahlbr.

Cat. Lich. Univers. 2: 408, 1923.

= ***Diorygma hieroglyphicum*** (Pers.) Staiger & Kalb, in Kalb et al., Symb. Bot. Upsal. 34(1): 151, 2004.

Following Kalb et al. (2004), this taxon is a synonym of *Diorygma hieroglyphicum* (Pers.) Staiger & Kalb. It is a corticolous species reported from Fujian (Jia and Wei 2016), Hainan (Meng and Wei 2008; Wei et al. 2013; Jia and Wei 2016), Yunnan (Meng and Wei 2008; Jia and Wei 2016), Hong Kong (Thrower 1988) and Taiwan (Aptroot and Sparrius 2003). The material illustrated in Thrower (1988: 97) should be *Diorygma hololeucum* (Mont. & Bosch) Kalb, Staiger & Elix, not *D. hieroglyphicum*, because of its morphological characteristics and the presence of protocetraric acid.

14. *Graphina hunanensis* Zahlbr.

in Handel-Mazzetti, Symb. Sin. 3: 54, 1930.

≡ ***Graphis hunanensis*** (Zahlbr.) M. Nakan. & Kashiw., in Nakanishi, Kashiwadani & Moon, Bull. Natn. Sci. Mus., Tokyo, B 29(2): 87, 2003.

Following Nakanishi et al. (2003), this taxon belongs in *Graphis* as *G. hunanensis* (Zahlbr.) M. Nakan. & Kashiw. It is a saxicolous species reported from Hunan (type location, Zahlbruckner 1930, 1932).

15. *Graphina incrustans* (Fée) Müll. Arg.

Mém. Soc. Phys. Hist. nat. Genève 29(8): 47, 1887.

≡ ***Fissurina incrustans*** Fée, Essai Crypt. Exot. (Paris) : 60, 1825.

Following Staiger (2002), this taxon belongs in *Fissurina* as *F. incrustans* Fée. It is a corticolous species reported from Hong Kong (Thrower 1988; Aptroot and Seaward 1999; Aptroot and Sipman 2001).

16. *Graphina isabellina* Zahlbr.

in Handel-Mazzetti, Symb. Sin. 3: 58, 1930.

≡ ***Diorygma isabellinum*** (Zahlbr.) Z.F. Jia & Lücking, **comb. nov.** (see below).

This species has a *Diorygma*-like thallus and ascomata and large, muriform, hyaline ascospores 110–120 × 35–48 µm. It is similar to *Diorygma hieroglyphicum*, but the latter differs by its larger ascospores, 170–250 × 42–58 µm (Kalb et al. 2004). Hence, we transfer the species to *Diorygma* as *D. isabellinum* (Zahlbr.) Z.F. Jia & Lücking (see below). It is a corticolous species reported from Hunan (type location, Zahlbruckner 1930, 1932).

17. *Graphina japonica* var. *major* Zahlbr.

Feddes Repert. 31: 213, 1933.

= ***Graphis japonica*** (Müll. Arg.) A.W. Archer & Lücking, in Lücking, Archer & Aptroot, Lichenologist 41(4): 437, 2009.

Following Lücking et al. (2009), this taxon is a synonym of *Graphis japonica* (Müll. Arg.) A.W. Archer & Lücking. It is a corticolous species reported from Zhejiang (Jia and Wei 2016), Fujian (Jia and Wei 2011, 2016), Hainan (Jia and Wei 2011, 2016; Wei et al. 2013), Hong Kong (Jia and Wei 2016) and Taiwan (type location as *Graphina japonica* var. *major* Zahlbr., Zahlbruckner 1933, 1940; Wang and Lai 1973).

18. *Graphina lapidicola* (Fée) Müll. Arg.

Flora 68: 513, 1885.

≡ ***Graphis lapidicola*** Fée, Bull. Soc. Bot. Fr. 21: 28, 1874.

Following Lücking et al. (2009), this taxon belongs to *Graphis* as *G. lapidicola* Fée. As the epithet suggests, it is a mainly saxicolous or sometimes corticolous species reported from Hainan (Jia and Wei 2011, 2016; Wei et al. 2013) and Hong Kong (Thrower 1988).

19. *Graphina lecanactiformis* Zahlbr.

in Handel-Mazzetti, Symb. Sin. 3: 57, 1930.

≡ ***Graphis lecanactiformis*** (Zahlbr.) Z.F. Jia & Lücking, **comb. nov.** (see below).

This species has a laterally carbonized exciple and hyaline, muriform ascospores 37–45 × 15–18 µm (Zahlbruckner 1933). The remaining type material is badly developed, but suggests placement in *Graphis*. Hence, we transfer it to *Graphis* as *G. lecanactiformis* (Zahlbr.) Z.F. Jia & Lücking (see below). It is a corticolous species reported from Yunnan (type location, Zahlbruckner 1930, 1932).

20. *Graphina marcescens* (Fée) Müll. Arg.

Mém. Soc. Phys. Hist. nat. Genève 29(8): 42, 1887.

≡ ***Carbacanthographis marcescens*** (Fée) Staiger & Kalb, in Staiger, Biblthca Lichenol. 85: 109, 2002.

Following Staiger (2002), this taxon belongs in *Carbacanthographis* as *C. marcescens* (Fée) Staiger & Kalb. It is a corticolous species reported from Hong Kong (Aptroot and Sipman 2001) and Guangxi (Jia et al. 2017).

21. *Graphina mendax* (Nyl.) Müll. Arg.
Revue Mycol. Toulouse 10(40): 177, 1888.
= ***Diorygma junghuhnii*** (Mont. & Bosch) Kalb, Staiger & Elix, Symb. Bot. Upsal. 34(1): 157, 2004.
Following Kalb et al. (2004), this taxon is a synonym of *Diorygma junghuhnii* (Mont. & Bosch) Kalb, Staiger & Elix. It is a corticolous species first reported under the name *Graphina mendax* from Hong Kong (Thrower 1988; Aptroot and Seaward 1999) and Taiwan (Aptroot and Sparrius 2003) and later as *Diorygma junghuhnii* from Fujian (Meng and Wei 2008; Jia and Wei 2016), Guangdong (Jia and Wei 2016), Guanxi (Jia and Wei 2016), Hainan (Meng and Wei 2008; Wei et al. 2013; Jia and Wei 2016), Guizhou (Jia and Wei 2016), Yunnan (Jia and Wei 2016) and Hong Kong (Jia and Wei 2016).

22. *Graphina olivascens* Zahlbr.
in Handel-Mazzetti, Symb. Sin. 3: 57, 1930. (non Zahlbruckner 1933: 215; see below *G. taiwanensis*)
= ***Fissurina adscribens*** (Nyl.) Z.F. Jia & Lücking (see below).
Based on characteristics of thallus and lirellae, this species has to be included in *Fissurina*. It agrees morphologically with *Fissurina adscribens* and its ascospore size falls in the range of the latter. Hence, we consider it a synonym to *F. adscribens* (see below). It is reported from Hunan (as *Graphina olivascens*, Zahlbruckner 1930, 1932).

23. *Graphina oxyspora* Zahlbr.
Feddes Repert. 31: 214, 1933.
≡ ***Graphis oxyspora*** (Zahlbr.) Lücking, in Lücking, Archer & Aptroot, Lichenologist 41(4): 439, 2009.
Following Lücking et al. (2009), this taxon belongs in *Graphis* as *G. oxyspora* (Zahlbr.) Lücking. It is a corticolous species reported from Taiwan (type location, Zahlbruckner 1933, 1940; Lamb 1963; Wang and Lai 1973).

24. *Graphina petrophila* Zahlbr.
Feddes Repert. 31: 213, 1933.
= ***Graphis japonica*** (Müll. Arg.) A.W. Archer & Lücking, in Lücking, Archer & Aptroot, Lichenologist 41(4): 437, 2009.
Following Lücking et al. (2009), this taxon is a synonym of *G. japonica* (Müll. Arg.) A.W. Archer & Lücking. It is a saxicolous species reported from Taiwan (type location as *Graphina petrophila* Zahlbr., Zahlbruckner 1933, 1940; Lamb 1963; Wang and Lai 1973).

25. *Graphina plumbea* Zahlbr.
in Handel-Mazzetti, Symb. Sin. 3: 55, 1930.
≡ ***Graphis plumbea*** (Zahlbr.) Lücking, in Lücking, Archer & Aptroot, Lichenologist 41(4): 440, 2009.

Following Lücking et al. (2009), this taxon belongs in *Graphis as G. plumbea* (Zahlbr.) Lücking. It is a corticolous species reported from Fujian (type location, Zahlbruckner 1930, 1932; Jia and Wei 2011, 2016), Zhejiang (Jia and Wei 2016), Hainan (Jia and Wei 2011, 2016; Wei et al. 2013) and Hong Kong (Jia and Wei 2016).

26. *Graphina plumbicolor* Zahlbr.

Feddes Repert. 31: 217, 1933.

= ***Phaeographis haloniata*** (Zahlbr.) Z.F. Jia & Lücking (see below).

From the characteristics of thallus and lirellae, this species is also a *Phaeographis*. It agrees with *Graphina haloniata* Zahlbr. and hence is placed in synonymy with the newly combined *Phaeographis haloniata* (Zahlbr.) Z.F. Jia & Lücking (see below). It is a corticolous species reported from Taiwan (type location, Zahlbruckner 1933, 1940; Lamb 1963; Wang and Lai 1973).

27. *Graphina roridula* Zahlbr.

in Handel-Mazzetti, Symb. Sin. 3: 59, 1930.

incl. var. ***platypoda*** Zahlbr., in Handel-Mazzetti, Symb. Sin. 3: 60, 1930.

= ***Diorygma pachygraphum*** (Nyl.) Kalb, Staiger & Elix, Symb. Bot. Upsal. 34(1): 163, 2004.

From the characteristics of thallus and lirellae, this species belongs in *Diorygma*. It is very similar to *Diorygma pachygraphum* (Nyl.) Kalb, Staiger & Elix and here added as a further synonym to that species, including its variety *platypoda* Zahlbr. *Diorygma pachygraphum* is a corticolous species reported from Hunan and Yunnan (type locations of *Graphina roridula* Zahlbr. and *G. roridula* var. *platypoda* Zahlbr., Zahlbruckner 1930, 1932), and also reported from Fujian (Meng and Wei 2008; Jia and Wei 2016), Guangxi (Jia and Wei 2016), Hainan (Wei et al. 2013; Jia and Wei 2016), Guizhou (Jia and Wei 2016) and Yunnan (Jia and Wei 2016).

28. *Graphina soozana* Zahlbr.

Feddes Repert. 31: 215, 1933.

≡ ***Diorygma soozana*** (Zahlbr.) M. Nakan. & Kashiw., in Nakanishi, Kashiwadani & Moon, Bull. Natn. Sci. Mus., Tokyo, B 29(2): 86, 2003.

Following Nakanishi et al. (2003), this taxon belongs in *Diorygma* as *D. soozana* (Zahlbr.) M. Nakan. & Kashiw. It is a corticolous species reported from Taiwan (type location, Zahlbruckner 1933, 1940; Lamb 1963; Wang and Lai 1973), Zhejiang (Wu and Qian 1989), and then reported from Fujian, Sichuan, Guizhou and Yunnan (Meng and Wei 2008; Jia and Wei 2016).

29. *Graphina subpulicaris* Zahlbr.

Feddes Repert. 31: 212, 1933.

= ***Graphis cleistoblephara*** Nyl., Ann. Sci. Nat., Bot., sér. 4 20: 265, 1863.

This name is a synonym of *Graphina cleistoblephara* (Nyl.) Zahlbr. (Wei 1991). Following Staiger (2002) the latter belongs to *Graphis* as *G. cleistoblephara* Nyl. It is

a corticolous species reported from Taiwan under the name *Graphina subpulicaris* Zahlbr. (type location, Zahlbruckner 1933).

30. *Graphina symplocorum* Zahlbr.

in Handel-Mazzetti, Ann. K. K. Naturh. Hofmus. Wien 40: 142, 1926.

= ***Graphis renschiana*** (Müll. Arg.) Stizenb., Ber. Tät. St Gall. Naturw. Ges.: 184, 1891.

Following Lücking et al. (2009), this taxon is a synonym of *Graphis renschiana* (Müll. Arg.) Stizenb. It is a corticolous species reported under the name *Graphina symplocorum* Zahlbr. from Hunan (type location, Zahlbruckner 1930), and as *Graphis renschiana* (Müll. Arg.) Stizenb. from Hainan, Guizhou and Yunnan (Wei et al. 2013; Jia and Wei 2011, 2016).

31. *Graphina taiwanensis* J.C. Wei

An Enumeration of Lichens in China (Beijing): 99, 1991; nom. nov. pro *Graphina olivascens* Zahlbr., in Feddes Repert. Spec. Nov. Regni Veg. 31: 215, 1933; nom. illeg. ICBN Art. 53 [non Zahlbr. 1930].

≡ ***Platygramme taiwanensis*** (J.C. Wei) Z.F. Jia & Lücking, **comb. nov.** (see below).

Graphina taiwanensis J.C. Wei was introduced as replacement name for *Graphina olivascens* Zahlbr. 1933 (based on the type from Taiwan, Asahina no. 346), [non *Graphis olivascens* Zahlbr. 1930: type from Hunan, Handel-Mazzetti no. 11220] (Wei 1991). It is unclear why Zahlbruckner described a new species under the same name as another species he had described three years prior.

From the characteristics of the thallus and lirellae and the large, muriform ascospores (80–105 × 15–18 µm), it is evident that this species belongs to *Platygramme*. It is similar to *P. platyloma* (Müll. Arg.) M. Nakan. & Kashiw. (Nakanishi et al. 2003), but the latter differs in having larger ascospores (more than 120 µm long) and absence of lichen substances; therefore the name is here recombined as *P. taiwanensis* (J.C. Wei) Z.F. Jia & Lücking (see below).

Graphina taiwanensis* f. *obscurata (Zahlbr.) J.C. Wei, An Enumeration of Lichens in China (Beijing): 99, 1991; *Graphina olivascens* f. *obscurata* Zahlbr., in Feddes Repert. Spec. Nov. Regni Veg. 31: 215, 1933 (legitimate acc. to ICN Art. 55.2).

= ***Platygramme taiwanensis*** (J.C. Wei) Z.F. Jia & Lücking, **comb. nov.** (see below).

Graphina olivascens f. *obscurata* was described by Zahlbr. (1933) as a variety of *G. olivascens* Zahlbr. (1933), which is a later homonym of *G. olivascens* Zahlbr. (1930). Wei (1991) introduced a replacement name for the species and then correctly recombined the infraspecific name with Zahlbruckner as basionym author. The type of the latter is clearly conspecific with the type of *G. olivascens* Zahlbr. (1933) (≡ *G. taiwanensis* J.C. Wei) and hence the two names are added as synonyms to *Platygramme taiwanensis* (J.C. Wei) Z.F. Jia & Lücking.

Graphina taiwanensis is a corticolous species reported from Taiwan (type location, Zahlbruckner 1933; Lamb 1963; Wang and Lai 1973; Wei 1991).

32. *Graphina verruculina* Zahlbr.

in Handel-Mazzetti, Symb. Sin. 3: 58, 1930.

= ***Graphis japonica*** (Müll. Arg.) A.W. Archer & Lücking, in Lücking, Archer & Aptroot, Lichenologist 41(4): 437, 2009.

Following Lücking et al. (2009), this taxon is a synonym of *G. japonica* (Müll. Arg.) A.W. Archer & Lücking. It is a corticolous species reported under the name *Graphina verruculina* Zahlbr. from Fujian (type location, Zahlbruckner 1930; 1932).

33. *Graphina virginea* (Eschw.) Müll. Arg.

Bull. Herb. Boissier 3(2): 47, 1895.

= *Diorygma poitaei* (Fée) Kalb, Staiger & Elix, Symb. Bot. Upsal. 34(1): 164, 2004.

Following Kalb et al. (2004), this taxon is a synonym of *D. poitaei* (Fée) Kalb, Staiger & Elix. *Graphina virginea* (Eschw.) Müll. Arg. was reported from Hong Kong (Thrower 1988, p. 101), but according to her photograph and description, the material has norstictic acid, non-pruinose discs, 1-spored asci and hyaline muriform ascospores 50–60 × 15–25 µm in size and may represent a species of *Thalloloma*, such as *T. anguinaeforme* (Vain.) Staiger.

Nomenclatural novelties

1. *Fissurina adscribens* (Nyl.) Z.F. Jia & Lücking, comb. nov.

MycoBank: MB821429

Figure 1A–B

Bas.: ***Graphis adscribens* Nyl.,** in Bull. Soc. Linn. Normandie, ser. 2., 2: 117, 1868; *Graphina adscribens* (Nyl.) Müll. Arg. in Hedwigia 31: 284, 1892.

= *Graphina olivascens* Zahlbr., in Feddes Repert. Spec. Nov. Regni Veg. 31: 215, 1930 (non Zahlbr. 1933); Type: China (Hunan), *Handel-Mazzetti 11220* (holotype W!)

Description. Thallus corticolous, crustose, surface grey to olive, waxy and smooth; apothecia lirelliform, elongate, *Fissurina*-morph, single and rarely branched, 2–4.5 mm long and 0.2–0.35 mm wide; discs closed, slit-shaped; proper margin unconspicuous, concolorous with thallus; proper exciple not carbonized; hymenium clear, at most 150 µm high, I–; 8 ascospores per ascus, hyaline, ellipsoid, muriform, 8/3–4 locular, I–, 22–30 × 8–9 µm.

Chemistry. No substances present.

Notes. Because of the characteristics of thallus and lirellae, this species belongs to *Fissurina*. It is similar to *Fissurina subnitida* (Nyl.) Nyl. but differs by having smaller ascospores (*F. subnitida*: 27–35 × 13–16 µm; Staiger 2002). Therefore, we accept the name in *Fissurina* as *F. adscribens* (Nyl.) Z.F. Jia & Lücking. The type material of *Graphina olivascens* has *Fissurina*-like lirellae, hyaline, muriform ascospores (8/3–4

Figuer 1. A, B Type *Graphina olivascens* (*Handel-Mazzetti 11220*) **C, D** Type *Graphina isabellina* (*Handel-Mazzetti 11437*) **E, F** Type *Graphina lecanactiformis* (*Handel-Mazzetti 7147*).

locular, I–, 20–25 × 8–9 µm; Zahlbruckner 1930) and lacks lichen substances, and its characteristics fall within the range of *F. adscribens*, and it is here placed as synonym of the latter. *Fissurina adscribens* is a corticolous species reported from Hunan (as *Graphina olivascens*, Zahlbruckner 1930, 1932). Unfortunately, the material reported from Hong Kong as *Graphina adscribens* (Thrower 1988: 92) could not be studied but based on its reported chemistry (stictic and constictic acids) and larger ascospores (30–35 × 5–10 µm) represents another species of *Fissurina*.

2. *Diorygma isabellinum* (Zahlbr.) Z.F. Jia & Lücking, comb. nov.
MycoBank: MB821431
Figure 1C–D

Bas.: *Graphina isabellina* Zahlbr., in Handel-Mazzetti, Symb. Sin. 3: 58, 1930; Type: China (Hunan), *Handel-Mazzetti 11437* (holotype W!).

Description. Thallus corticolous, crustose, surface milk-white, somewhat yellowish, warty and rough; apothecia lirelliform, elongate, single and rarely branched, 2–4.5 mm long and 0.2–0.35 mm wide; labia obvious; discs closed to slightly opened; proper margin conspicuous, concolorous with the thallus; proper exciple not carbonized; hymenium clear, 160–180 µm high. I–; 1 ascospore per ascus, hyaline, ellipsoid, muriform, I+ violet, 110–120 × 35–48 µm.

Chemistry. Norstictic acid (major), connorstictic acid (minor or trace).

Notes. Because of the characteristics of thallus, lirellae and ascospores, this species belongs to *Diorygma* and is here recombined as *D. isabellinum* (Zahlbr.) Z.F. Jia & Lücking. It is similar to *D. pachygraphum*, but differs by smaller ascospores, the latter having ascospores 170–250 × 42–58 µm; it also similar to *D. junghuhnii* (Mont. & Bosch) Kalb, Staiger & Elix, but the latter differs in a I+ blue-violet hymenium and and smaller ascospores (60–)80–125 × 21–42 mm (Kalb et al. 2004). In the recent world key to *Diorygma* (Feuerstein et al. 2014), this species would key out at couplet 41.

3. *Graphis lecanactiformis* (Zahlbr.) Z.F. Jia & Lücking, comb. nov.
MycoBank: MB821432
Figure 1E–F

Bas.: *Graphina lecanactiformis* Zahlbr., in Handel-Mazzetti, Symb. Sin. 3: 57, 1930; Type: China (Yunnan), *Handel-Mazzetti 7147* (holotype W!).

Description. Thallus corticolous, crustose, surface grey-yellowish, slightly rough; apothecia lirelliform, sessile, oval to elongate, single, not branched, 1–1.2 mm long and 0.6–0.9 mm wide; discs open in the type material and appearing yellow-brown pruinose, but this could be due to damage; labia entire; proper margin conspicuous, black; proper exciple laterally carbonized; hymenium clear, 240–290 µm high. I–; 8 ascospores per ascus, hyaline, ellipsoid, muriform, 7–8/1–3 locular, I+ violet, 37–45 × 15–18 µm.

Chemistry. No substances present.

Notes. Because of the characteristics of thallus and lirellae, this species belongs to *Graphis* and is here recombined as *G. lecanactiformis.* It is similar to *Graphis tenuirima* (Shirley) A.W. Archer in anatomy, but differs in ascoma morphology (*dussii* morph according to Lücking et al. 2009) and the larger ascospores. In the world key to *Graphis* (Lücking et al. 2009), this species would key out at couplet 23 in Group 5.

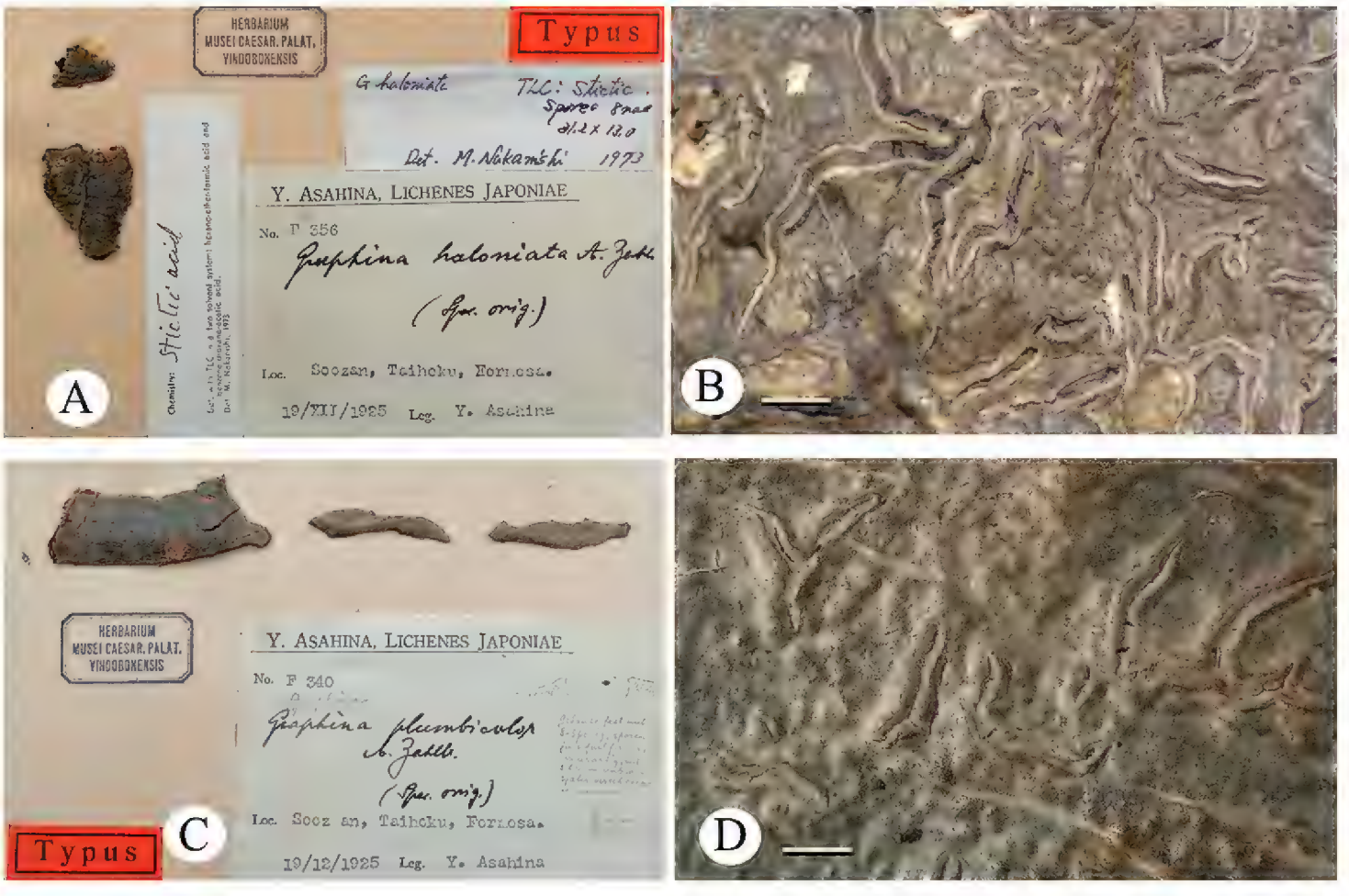
4. *Phaeographis haloniata* (Zahlbr.) Z.F. Jia & Lücking, comb. nov.
MycoBank: MB821433
Figure 2A–D

Bas.: *Graphina haloniata* Zahlbr., Feddes Repert. 31: 216, 1933; Type: China (Taiwan), *Asahina 356* (holotype W!)
= *Graphina plumbicolor* Zahlbr., Feddes Repert. 31: 217, 1933; Type: China (Taiwan), *Asahina 340* (holotype W!)

Description. Thallus corticolous, crustose, thick, surface grey to olive-green, waxy and slightly warty; apothecia lirelliform, elongate, single and rarely branched, at most 9.0 mm long and 0.5 mm wide; discs open, brownish, slightly pruinose, flat to somewhat concave; proper margin obvious, concolorous with thallus; proper exciple slightly carbonized basally; hymenium inspersed, 100–125 µm high, I–; 8 ascospores per ascus, brownish, ellipsoid, muriform, 8/1–3 locular, I+ violet-brown, 30–35 × 10–14 µm.

Chemistry. Stictic acid.

Notes. Because the material of *Graphina haloniata* in W has the typical characteristics of *Phaeographis*, such as open discs and brownish ascospores, it is here transferred to *Phaeographis*. The reported differences between *Graphina haloniata* and *G. plumbicolor* were in ascospore size: 30–34 × 12–14 µm in *G. haloniata* and 29–30 × 10–11 µm in *G. plumbicolor* (Zahlbruckner 1933), but in the studied material these measurements largely overlap. The two names were only reported from their type locations in Taiwan (Zahlbruckner 1933, 1940; Lamb 1963; Wang and Lai 1973; Wei 1991).



Figuer 2. A, B Type *Graphina haloniata* (*Asahina 356*) **C, D** Type *Graphina plumbicolor* (*Faurie 83*).

5. *Platygramme taiwanensis* (J.C. Wei) Z.F. Jia & Lücking, comb. nov.
MycoBank: MB821436
Figure 3A–D

Bas.: *Graphina taiwanensis* J.C. Wei, An Enumeration of Lichens in China (Beijing): 99, 1991; nom. nov. pro *Graphina olivascens* Zahlbr., in Feddes Repert. Spec. Nov. Regni Veg. 31: 215, 1933; nom. illeg. ICBN Art. 53 [non Zahlbr. 1930]; Type: China (Taiwan), *Asahina 346* (holotype W!)

= *Graphina taiwanensis* f. *obscurata* (Zahlbr.) J.C. Wei, An Enumeration of Lichens in China (Beijing): 99, 1991; *Graphina olivascens* f. *obscurata* Zahlbr., in Feddes Repert. Spec. Nov. Regni Veg. 31: 215, 1933 (legitimate acc. to ICN Art. 55.2). Type: China (Taiwan), *Asahina 375* (holotype W!)

Description. Thallus corticolous, crustose, thin, surface cervine to slightly olive, smooth; apothecia lirelliform, elongate, strong, adpressed, single and short branched, 1.5–3 mm long and 0.2–0.3 mm wide; labia entire, distinctly; discs closed or very narrow, epruinose; proper margin obvious, concolorous with the thallus; proper exciple laterally carbonized; hymenium clear, 130–150 µm high. I–; asci long clavate, 1-spored; ascospores, hyaline to grayish, subcylindrical to oblong, ends obtuse, muriform with dense locules, I+ red-brown, 80–105 × 15–18 µm.

Chemistry. Stictic acid.

Figuer 3. A, B Type *Graphina taiwanensis* (*Asahina 346*) **C, D** *Graphina taiwanensis* f. *obscurata* (*Asahina 346*).

Notes. The material of *Graphina taiwanensis* and f. *obscurata* in W shows the characteristics of *Platygramme* such as the distinctly labiate lirellae, closed discs, a laterally carbonized exciple and hyaline to grayish ascospores. *Platygramme taiwanensis* is most similar to *P. platyloma*, but the latter differs in having an inspersed hymenum, larger ascospores (more than 120 µm long) and lack of lichen substances. *Platygramme pudica* (Mont. & Bosch) M. Nakan. & Kashiw. differs in having an inspersed hymenum, larger ascospores (150–180 × 18–25 µm) and echinocarpic acid (Jia and Kalb 2013). The form *obscurata* only differs from the nominal taxonby the darker thallus, which is largely caused by the bark, and hence we include it in *P. taiwanensis*. The species was only reported from the type location in Taiwan (Zahlbruckner 1933; Lamb 1963; Wang and Lai 1973, Wei 1991).

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